Amendments to the Claims

A listing of the pending claims is as follows:

1. (Currently amended) A percussion drill bit for drilling into a subterranean earth formation, the drill bit having a central longitudinal axis and being operable by applying axial percussive motion along the axis and rotary motion about the axis, the drill bit comprising:

a plurality of blades protruding from the drill bit;

a plurality of flow channels stretching along the drill bit in a substantially radial direction whereby the successive flow channels are formed between two adjacent blades;

shear cutters which are provided in a row on or close to the leading edge of at least one of said blades with respect to the direction of rotary motion trailingly adjacent to the flow channel that is associated with it, for running a fluid through and thereby removing cutting debris accumulating in front of the row of shear cutters; and in addition to these shear cutters, ~~; and~~

axial impact cutters which are located, with respect to the direction of rotary motion, in a trailing position with respect to said row of shear cutters and its associated flow channel.

2. (Original) The percussion drill bit of claim 1, wherein the axial cutters are provided ahead of the subsequent neighbouring flow channel with respect to the direction of rotary motion.

3. (Original) The percussion drill bit of claim 2, wherein the subsequent neighbouring flow channel is associated with a second row of shear cutters provided on the leading edge of the subsequent blade to the said at least one blade.

4. (Original) The percussion drill bit of claim 1, wherein the axial cutters are located on the same blade as the shear cutters.

5. (Currently amended) The percussion drill bit of claim 1, wherein the axial cutters ~~comprise dome shaped or essentially hemispherical shaped cutting surfaces~~are arranged such that the penetration depth of said shear cutters is less than that of the axial cutters.

6. (Previously presented) The percussion drill bit of claim 1, wherein the axial cutters are formed essentially of tungsten carbide.

7. (Original) The percussion drill bit of claim 6, wherein the axial cutters are provided with an outer layer of polycrystalline carbon.

8. (Previously presented) The percussion drill bit of claim 1, wherein there are more axial cutters provided than shearing cutters.

9. (Previously presented) The percussion drill bit of claim 1, wherein the ratio between the number of axial cutters and the number of shearing cutters provided is at least 3:2.

10. (Previously presented)The percussion drill bit of claim 1, wherein the shear cutters in a first said row of shear cutters are positioned at mutually different radial positions than the shear cutters in a second said row of shear cutters on another blade.

11. (Previously presented)The percussion drill bit of claim 1, wherein the shear cutters have a rake surface facing the flow channel associated with it at a back-rake angle of less than 90° wherein the back-rake angle is defined as the included angle between the projection of a line perpendicular to said rake surface on a plane defined by said central longitudinal axis of the drill bit and the tangential direction of rotary motion, and a plane perpendicular to said longitudinal axis.

12. (Previously presented) The percussion drill bit of claim 1, wherein one or more of the shear cutters is provided with a pre-cut flat impact surface essentially parallel to the plane perpendicular to the central longitudinal axis.

13. (Currently amended) A drilling system for drilling a borehole in an earth formation, comprising a drill string provided with a percussion drill bit having a central longitudinal axis and being operable by applying axial percussive motion along the axis and rotary motion about the axis, the drill bit comprising:

a plurality of blades protruding from the drill bit;

a plurality of flow channels stretching along the drill bit in a substantially radial direction whereby the successive flow channels are formed between two adjacent blades;

shear cutters which are provided in a row on or close to the leading edge of at least one of said blades with respect to the direction of rotary motion trailingly adjacent to the flow channel that is associated with it, for running a fluid through and thereby removing cutting debris accumulating in front of the row of shear cutters; and in addition to these shear cutters; and

axial impact cutters which are located, with respect to the direction of rotary motion, in a trailing position with respect to said row of shear cutters and its associated flow channel,

the drilling system further comprising:

first drive means for rotating the drill bit in the borehole so as to induce a scraping movement of the shear cutters along the borehole bottom; and

second drive means for inducing a longitudinal reciprocal movement of the drill bit in the borehole so as to induce at least the axial cutters to exert a percussive force to the borehole bottom.

14. (Currently amended) A method of drilling a bore hole into a subterranean earth formation, comprising the steps of

providing a drilling system comprising

a drill string provided with a percussion drill bit having a central longitudinal axis and being operable by applying axial percussive motion along the axis and rotary motion about the axis, the drill bit comprising:

a plurality of blades protruding from the drill bit;

a plurality of flow channels stretching along the drill bit in a substantially radial direction whereby the successive flow channels are formed between two adjacent blades;

shear cutters which are provided in a row on or close to the leading edge of at least one of said blades with respect to the direction of rotary motion trailingly adjacent to the flow channel that is associated with it, for running a fluid through and thereby removing cutting debris accumulating in front of the row of shear cutters; and in addition to these shear cutters; and

axial impact cutters which are located, with respect to the direction of rotary motion, in a trailing position with respect to said row of shear cutters and its associated flow channel,

first drive means for rotating the drill bit in the borehole so as to induce a scraping movement of the shear cutters along the borehole bottom, and

second drive means for inducing a longitudinal reciprocal movement of the drill bit in the borehole so as to induce at least the axial cutters to exert a percussive force to the borehole bottom; and

placing the drill bit against the subterranean earth formation that is to be drilled, exercising a rotary motion about the axis while maintaining a force on the drill bit against the earth formation in the axial direction, and intermittingly providing percussive strikes on the drill bit.

15. (Previously presented) The percussion drill bit of claim 13, wherein the axial cutters are provided ahead of the subsequent neighbouring flow channel with respect to the direction of rotary motion.

16. (Previously presented) The percussion drill bit of claim 13, wherein the axial cutters are formed essentially of tungsten carbide.

17. (Previously presented) The percussion drill bit of claim 16, wherein the axial cutters are provided with an outer layer of polycrystalline carbon.

18. (Previously presented) The percussion drill bit of claim 13, wherein the ratio between the number of axial cutters and the number of shearing cutters provided is at least 3:2.

19. (Previously presented) The percussion drill bit of claim 13, wherein the shear cutters have a rake surface facing the flow channel associated with it at a back-rake angle of less than 90° wherein the back-rake angle is defined as the included angle between the projection of a line perpendicular to said rake surface on a plane defined by said central longitudinal axis of the drill bit and the tangential direction of rotary motion, and a plane perpendicular to said longitudinal axis.

20. (Previously presented) The percussion drill bit of claim 13, wherein one or more of the shear cutters is provided with a pre-cut flat impact surface essentially parallel to the plane perpendicular to the central longitudinal axis.